UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRIAN MATTHEWS, STEPHEN M. SCHINDLER, and ALEKSEY E. BOLOTNIKOV

Appeal 2006-3358
Application 09/933,349
Technology Center 2800

Decided: March 26, 2007

Before JAMES D. THOMAS, JOSEPH F. RUGGIERO, and HOWARD B. BLANKENSHIP, *Administrative Patent Judges*.

BLANKENSHIP, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 1-5, 9, and 10. We have jurisdiction under 35 U.S.C. §§ 6(b), 134(a).

INTRODUCTION

The claims are directed to semiconductor devices having indium bumps that provide electrical connections but can also serve to separate components in an assembly. Claim 1 is illustrative:

1. A solid-state detector comprising:

a pixilated semiconductor detector having plurality of individual indium bumps arrayed on a surface of the detector, wherein the indium bumps are in electrical contact with the surface and are situated in defined locations on the surface, and the indium bumps have a height of between 15 to 100 μm.

The Examiner relies on the following prior art reference to show unpatentability:

Hu	US 5,092,036	Mar. 3, 1992

Claims 6-8 have been withdrawn from consideration.

The rejections as presented by the Examiner are as follows:

1. Claims 1-5, 9, and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C § 103(a) as unpatentable over Hu.

OPINION

Hu notes that, in prior art fabrication of detector array assemblies, indium bumps made by vapor deposition had a typical height of 6-9 μm. Indium bumps of acceptable quality having a height of more than 10 μm were not possible. Hu col. 1, ll. 37-42. Hu further teaches that problems relating to thermal fatigue could be minimized to an extent by making the indium bumps taller or longer to increase the spacing between a detector and a readout chip, while maintaining the desired circuit connections. *Id.* at ll. 58-64.

Hu describes embodiments for making "ultra-tall" indium bump arrays. In a first embodiment, Hu describes obtaining a known integrated circuit connector or interconnect pad having metal tubes 24 extending through film 22 (Fig. 2). The interconnect pad is, *inter alia*, dipped in molten indium for forming indium columns between components. Hu col. 5, l. 51 - col. 6, l. 8.

The Examiner and Appellants agree in substance that Hu describes indium columns having a height of about 115 μm before cold welding, based on dimensions given at column 2, lines 21 through 25. The Examiner and Appellants agree in substance that Hu does not provide express disclosure of indium column height of less than about 115 μm in any of the described embodiments of the invention.

We agree with Appellants that the § 102(b) rejection of the claims fails to show that Hu describes, expressly or inherently, structure having indium bumps having a height of between 15 to 100 μm as recited in independent claims 1, 4, and 5. We therefore do not sustain the rejection of the claims under 35 U.S.C. § 102(b) for anticipation.

With respect to the § 103(a) rejection, the Examiner finds that Hu would have suggested, to the skilled artisan, forming indium bumps taller than those that Hu describes as prior art (i.e., taller than 10 μm), but less tall than the described embodiment of 115 μm. Finding that Hu would have suggested indium bumps at least having a height of between 15 to 100 μm, the Examiner concludes that the subject matter as a whole of representative claim 1 would have been prima facie obvious at the time of invention.

Appellants submit in the Brief (at 9) that a prima facie case of obviousness exists when the ranges of a claimed combination overlap the

ranges disclosed in the prior art or when the differences therebetween are so minor that one skilled in the art would have expected them to have the same properties. That we presume to be a correct statement of the law. Appellants proceed to allege that the USPTO has failed to "carry the burden of establishing" either of the alternative requirements. We disagree with the implicit assumption, however, that Appellants have provided a comprehensive list of ways a prima facie case of obviousness may be established.

The § 103 rejection is based on what Hu would have taught one skilled in the art. What a reference teaches is a question of fact. *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994); *In re Beattie*, 974 F.2d 1309, 1311, 24 USPQ2d 1040, 1041 (Fed. Cir. 1992). Even if Appellants were to show that the claimed invention avoided *Appellants'* proffered basis for obviousness, such a showing does not necessarily demonstrate error in the Examiner's findings or conclusion.

In remarks that could be responsive to the rejection that *has* been applied, Appellants contend that Hu "teaches away" from the claimed invention. "A reference may be said to teach away when a person of ordinary skill, upon [examining] the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc.*, 73 F.3d 1085, 1090, 37 USPQ2d 1237, 1241 (Fed. Cir. 1995) (quoting *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994)).

Appellants do not, however, identify anything in Hu that would serve to warn the artisan against forming indium columns having a height of, for

example, 100 μm. Nor, for that matter, do we find anything in Hu that would warn the artisan against forming indium columns anywhere between 15 and 100 μm. We find that Hu does not "teach away" from the invention.

Appellants also submit that Hu describes the height of the connectors between chips as an important design feature, consistent with the instant Specification. Appellants base the argument on Hu's description at column 1, lines 58 through 68. (Br. 11.)

We find that Hu teaches, at the relevant section, minimizing problems in the prior art by making indium bumps taller or longer. The text refers, however, to the prior art fabrication process (in the same paragraph) that resulted in indium bumps of 10 μm or less in height. Hu thus teaches, in a fair reading of the section upon which Appellants rely, indium bumps having more than 10 μm in height.

We agree with Appellants to the extent that Hu teaches that increasing indium bump height results in a "more compliant" arrangement that is more tolerant to thermal effects (expansion and contraction). However, we find no evidence in this record in support of Appellants' assertion (Br. 11-12; Reply Br. 9) that one skilled in the art would have expected "Hu's connectors" to have different compliances and capacitances than those within the claimed range (e.g., inclusive of 100 μm).

As if acknowledging the deficiencies in the Brief, Appellants submit a new argument in the Reply Brief. According to Appellants, the Examiner "failed to establish" that Hu enables a person of ordinary skill in the art to make the claimed invention.

Appellants do not cite any authority for the belief that it is the Examiner's burden to establish that a reference is enabling. Appellants

could have, perhaps, provided evidence in support of the view that Hu is not enabling in response to the § 102(b) rejection. However, while a reference must enable someone to practice the invention in order to anticipate under § 102(b), a non-enabling reference may qualify as prior art for the purpose of determining obviousness under § 103. *Symbol Techs., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578, 19 USPQ2d 1241, 1247 (Fed. Cir. 1991).

In any event, the reference is a U.S. patent. A patent shall be presumed valid. 35 U.S.C. § 282. Hu's claims do not limit the invention to methods of fabricating indium columns of any particular height (e.g., 115 μm or taller). If the reference is believed to be not enabling, it is *Appellants'* burden to adduce evidence in support of the position.

Moreover, Hu describes use of a commercially available interconnect pad having substantially fixed dimensions. The reference also teaches the artisan, however, how to make (and use) a similar structure that is not limited to the fixed dimensions of the commercial product. Col. 2, ll. 25-35; col. 5, ll. 16-25.

We conclude that the Examiner has established a case for prima facie obviousness of the subject matter as a whole of representative claim 1 that has not been effectively rebutted. We sustain the § 103(a) rejection of claims 1-5, 9, and 10 over Hu.

CONCLUSION

The Examiner's rejection of claims 1-5, 9, and 10 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C § 103(a) as unpatentable over Hu is affirmed with respect to § 103(a) but reversed with respect to § 102(b). Since we have affirmed the rejection of

all claims on appeal on the § 103(a) basis, the Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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